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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.  | CONFIRMATION NO. |
|--|-------------|----------------------|----------------------|------------------|
| 10/537,954   | 06/08/2005  | Gunnar Hultquist     | 1026-0002WOUS        | 5447             |
| 49698  | 7590        | 07/24/2007           | EXAMINER             |                  |
| MICHAUD-DUFFY GROUP LLP<br>306 INDUSTRIAL PARK ROAD<br>SUITE 206<br>MIDDLETOWN, CT 06457 |             |                      | PALABRICA, RICARDO J |                  |
|  |             |                      | ART UNIT             | PAPER NUMBER     |
|  |             |                      | 3663                 |                  |
|  |             |                      | MAIL DATE            | DELIVERY MODE    |
|  |             |                      | 07/24/2007           | PAPER            |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/537,954             | HULTQUIST ET AL.    |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Rick Palabrica         | 3663                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 12 June 2007.
- 2a) This action is **FINAL**.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 15-29 is/are pending in the application.
- 4a) Of the above claim(s) 19-22 and 26-29 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 15-18 and 23-25 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date. _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

1. Applicant's 6/12/07 Amendment, which directly amended claims 15-18 and 25, and traversed the rejection of claims in the 3/12/07 Office action, is acknowledged.

Applicant argues that the amended claims define over the applied art because of the added limitation of an initial fill gas containing a proportion of inert gas and carbon monoxide.

Applicant's arguments with respect to the rejected claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 15-18 and 23-25 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15 recites the limitation, "whereby the initial fill gas contains a proportion of inert gas and a carbon monoxide having a ratio based on the partial pressures thereof of at least 0.03." Underlining provided. The claim is vague, indefinite and incomplete, and its metes and bounds cannot be determined because it is unclear whether the term, "at least 0.03", refers to the ratio of partial pressures or to the ratio the two components of the fill gas.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 15 and 23-25 rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrari (U.S. 4,609,524) in view of either one of Inagaki et al. (U.S. 4,810,461) or Ferrari (U.S. 3,677,894): Ferrari ('524) discloses the applicant's claim limitations except for the gas pressures.

Ferrari ('524) teaches a nuclear fuel rod for a boiling water reactor (see Fig. 1) comprising a zirconium alloy cladding 2 and a plurality of nuclear pellets 6.

As to claims 15, 24 and 25, Ferrari ('524) teaches that adding 2-3 percent volume of carbon monoxide to the helium gas inside the fuel rod is advantageous because it reduces tritium permeation. Clearly, Ferrari ('524) introduces the carbon monoxide and helium into the fuel rod as initial fill gases.

Applicant cites Ferrari ('524) as prior art but asserts that the purpose of the additional gas is to reduce tritium permeability instead of preventing hydrogenation and secondary degrading (see page 4 of the Specification). The examiner notes that the claims are directed to a product (i.e., a nuclear fuel rod) and not to a process. Although the gases in Ferrari ('524) may be intended for reduction of tritium permeation, these gases inherently also prevent hydrogenation and secondary degrading. Since the structure and method of operation of in Ferrari ('524) is the same as that recited in the

claims, the references must each inherently function in the same manner to produce the same results as applicant's situation. As to limitations which are considered to be inherent in a reference, note the case law of *In re Ludtke*, 169 USPQ 563, *In re Swinehart*, 169 USPQ 226, *In re Fitzgerald*, 205 USPQ 594, *In re Best et al.*, 195 USPQ 430, and *In re Brown*, 173 USPQ 685, 688.

Inagaki et al. teach that the inert gas in a fuel rod of a boiling water reactor (as shown in Figs. 6 and 7) is charged at a pressure of 1-3 atm (e.g., see col. 6, lines 7+).

Ferrari ('894) teaches that the fuel rods in boiling water and pressurized water reactors contain gas at a pressure in the order of at least 100 psi at 25°C, to withstand the pressures of the water coolant (see col. 3, lines 22+).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the fuel rod in Ferrari ('524), by the teaching of either one of Inagaki et al. or Ferrari ('894), to have an initial fill gas pressure of at least 2 bars, to gain the advantages thereof (i.e., prevent deformation of the fuel rod), because such modification is no more than the use of a well known expedient within the nuclear art.

As to the limitation in claim 15, ““whereby the initial fill gas contains a proportion of inert gas and a carbon monoxide having a ratio based on the partial pressures thereof of at least 0.03,” the term, whereby, connotes a condition arising as a direct consequence or result of the immediately preceding structure or step recited. Thus, the above combination inherently meets this limitation because it meets the preceding structural limitations of “a cladding tube”, “plurality of nuclear pellets” and “initial fill gas”.

As to claim 23, applicant has not defined the degree of pre-oxidization of the inner surface of the cladding tube. Absent such definition, the examiner interprets the term broadly and reads it on the inherent pre-oxidation of the zirconium alloy tube of Ferrari ('524). This pre-oxidation occurs as a result of inherent exposure to the environment following the manufacture of a tube that is subsequently used to make the fuel rod in Ferrari ('524).

Either one of Ferrari ('524)-Inagaki et al. combination or the Ferrari ('524)-Ferrari ('894) combination meets the limitation of the carbon monoxide to inert gas partial pressure ratio of 0.03, by reason of the volumetric ratio that Ferrari ('524) teaches and the gas pressures that either Inagaki et al. or Ferrari ('894) teaches. If applicant is of a different opinion, the claims are still not patentable because the limitation is a matter of optimization within prior art conditions or through routine experimentation (see MPEP 2144.05 II.A). The selected partial pressure ratio of the gases would be one that achieves the desired result at the minimum cost of time, effort and material.

3. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrari ('524) in view of either one of Inagaki et al. or Ferrari ('894), as applied to claims 15-18 and 23-25 above, and further in view of King (U.S. 5,329,566) or Adamson (U.S. 4,894,203). Either one of Ferrari ('524)-Inagaki et al. or Ferrari ('524)-Ferrari ('894) combination discloses applicant's claim limitations except for the volume per cent of carbon monoxide in the fill gas.

Either one of King or Adamson teaches that carbon monoxide can have a deleterious effect on the cladding of a boiling water reactor (see col. 1, lines 47+ in King or col. 2, lines 10+ in Adamson et al.).

Thus, it would have been intuitively obvious to one having ordinary skill in the art at the time of the claimed invention to properly consider the advantages of having carbon monoxide in the fill gas of a boiling water reactor fuel rod in the Ferrari ('524)-Inagaki et al. or Ferrari ('524)Ferrari ('894), against the disadvantages of having carbon monoxide in the fill gas by the teaching in either King or Adamson. Therefore, the proportion of carbon monoxide in the initial fill gas, as recited in the above claims, is a matter of optimization within prior art conditions or through routine experimentation (see MPEP 2144.05 II.A). It would have been obvious to said artisan to have determined the proper carbon monoxide/inert gas proportion such that reducing the permeability of the cladding to tritium does not adversely affect the cladding of the fuel rod.

### ***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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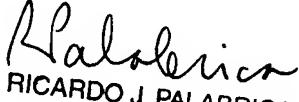
shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 571-272-6880. The examiner can normally be reached on 6:00-4:30, Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

July 16, 2007

  
Ricardo J. Palabrica  
PRIMARY EXAMINER